Vol. 86, No. 16, pp. 193–202 31 May 1973

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

TWO FRESHWATER COPEPODS FROM BARRANCAS, VENEZUELA: *NOTODIAPTOMUS CEARENSIS* (WRIGHT) AND *N. VENEZOLANUS DEEVEYORUM*, NEW SUBSPECIES (CALANOIDA: DIAPTOMIDAE)

By Thomas E. Bowman
Smithsonian Institution, Washington, D.C. 20560

In connection with their revision (Deevey and Deevey, 1971) of American species of the Cladoceran genus *Eubosmina*, Edward S. Deevey, Jr., and Georgiana B. Deevey made several plankton collections in 1967 in the vicinity of Barrancas, Monagas State, Northeastern Venezuela. One collection, labeled "Barrancas II," was made November 26 in a wide, shallow (maximum depth less than 2 meters), meandering gully. The gully was not connected at that time with the nearby Orinoco River, but obviously would connect when the river was in flood.

The "Barrancas II" collection, kindly made available to me by Mrs. Deevey, contained specimens of two superficially similar species of diaptomid copepods, *Notodiaptomus cearensis* (Wright, 1936) and *N. venezolanus* Kiefer (1954). *N. cearensis* was 3 times as numerous as *N. venezolanus*; in 270 specimens picked at random from the sample there were 203 *N. cearensis* and 67 *N. venezolanus*. Kiefer's description is entirely adequate; some confusion as to the date of publication of the specific name *venezolanus* could arise from the fact that Kiefer (1956) published almost the same description and illustrations 2 years after the original description, with the heading "*Notodiaptomus venezolanus* n. sp." and with no indication that the original description had already been published in 1954. The Barrancas specimens exhibited minor differences from Kiefer's specimens and are considered to represent a new subspecies.

Wright's description of *N. cearensis* is quite brief and only the ♂ 5th leg is illustrated. Hence, a fairly detailed redescription of *N. cearensis* is warranted. The specimens of both diaptomid species are deposited in the Division of Crustacea, Smithsonian Institution.

Notodiaptomus cearensis (Wright)

Figures 1–21, 33–35

Diaptomus cearensis Wright, 1936, pp. 80–81, pl. 1, fig. 2.
Notodiaptomus cearensis (Wright).—Kiefer, 1956, p. 242 [by implication].

Female: Length about 1.4 mm (prosome 1.10–1.15 mm). In dorsal view body widest at 1st pedigerous segment. 4th and 5th pedigerous segments fused dorsally, separated by suture laterally. 5th pedigerous segment produced into small obliquely directed wings ending in conical spines; wings nearly symmetrical.

Urosome apparently 2 segmented, but actually 3 segmented with most or all of 2nd segment telescoped into genital segment. Genital segment about 1.5 times as long as rest of urosome combined; anterior half expanded on either side into nearly symmetrical low rounded lobe with spine at apex; right lobe slightly more strongly produced. Right posterolateral corner of genital segment produced posteriorly into rounded lobe, sometimes scarcely evident. Caudal rami symmetrical, slightly more than half as wide as long.

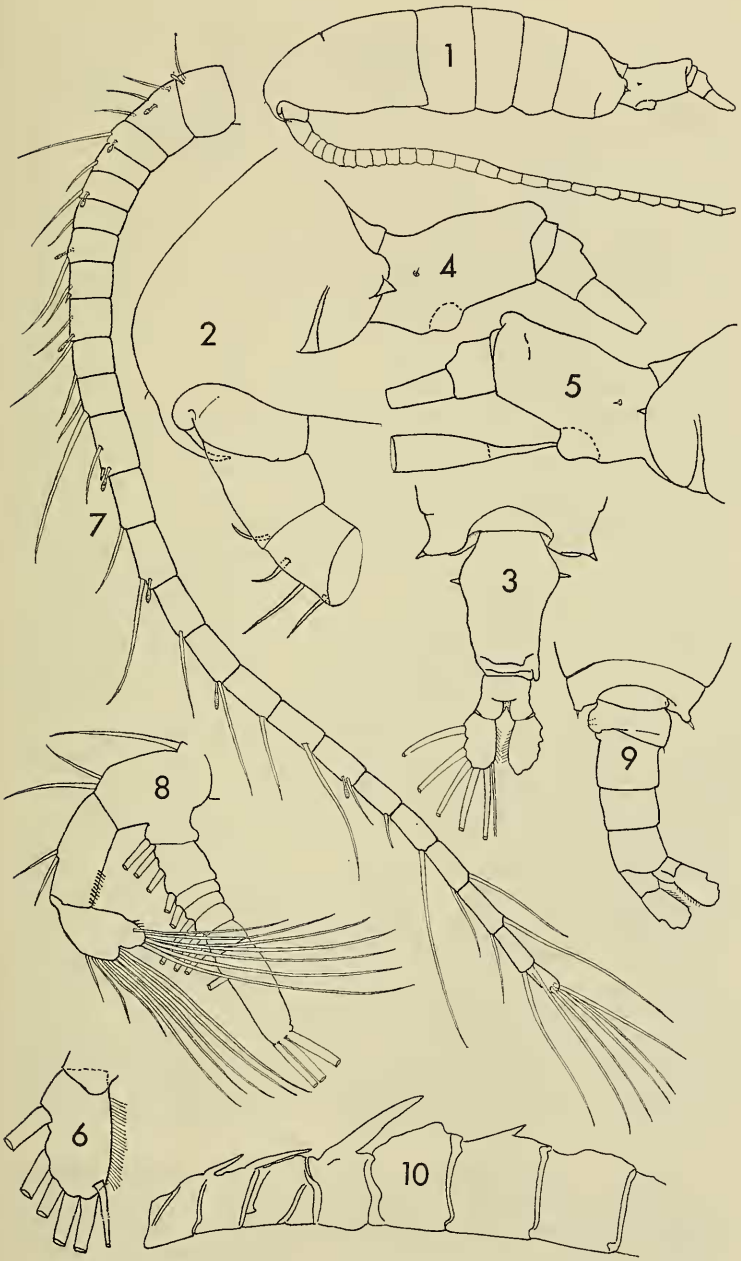
1st antenna reaching posterior end of caudal rami. Segment 11 with 2 setae; segments 13–21 each with 1 seta. Armature of segments shown in Figure 7.

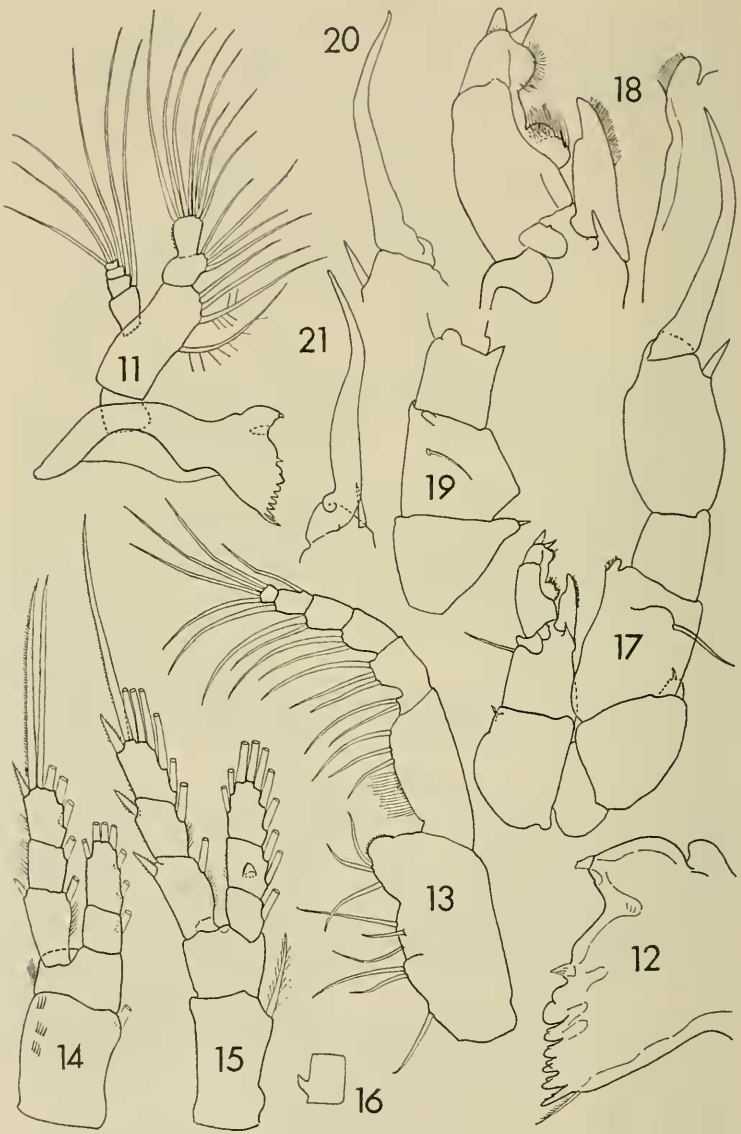
2nd antenna and mandible with normal complement of setae. Gnathal lobe of mandible with following dentition in ventral to dorsal order (nomenclature of teeth after Fleminger, 1967): Apical tooth blunt. Subapical tooth pointed. Medial teeth 3 in number, bicuspidate; ventralmost medial tooth much larger than others, with 2 broadly rounded cusps; the 2 dorsal medial teeth each with a larger rounded dorsal cusp and a smaller obtuse ventral cusp. Basal teeth 3 in number; the 2 ventral teeth bicuspidate, with obtuse cusps; dorsal tooth slender, with dentate ventral margin.

Maxilliped with 4 lobes of 1st basipod well developed; distal seta of 2nd lobe longer than proximal seta; 4th lobe with only 3 setae.

→

Figs. 1–10. *Notodiaptomus cearensis*. 1–8, ♀: 1, lateral view. 2, head, lateral. 3, urosome, dorsal. 4, urosome, left side. 5, urosome, right side. 6, caudal ramus, dorsal. 7, 1st antenna. 8, 2nd antenna. 9–10, ♂: 9, urosome, dorsal. 10, right 1st antenna, segments 10–16.


1
2
3
4
5
6
7
8
9
10



FIGS. 11–21. *Notodiaptomus cearensis.* 11–16, ♀: 11, mandible. 12, mandible, gnathal lobe. 13, maxilliped. 14, leg 1, posterior. 15, leg 2, posterior. 16, leg 2, 2nd endopod segment, lateral. 17–21, ♂ leg 5: 17, anterior view. 18, left leg and endopod of right leg, enlarged.

Swimming legs with normal armature of spines and setae. Leg 1 with 3 patches of hairs on posterior surface of 1st basipod. Leg 2 with triangular cuticular lobe on posterior surface of 2nd endopod segment.

Leg 5 (Figs. 33–34), posterior surface of 1st basipod with prominent conical process ending in heavy spine. 2nd basipod with long lateral seta reaching distal ¼ of 1st exopod segment. 1st exopod segment unarmed, twice as long as wide. 2nd exopod segment without lateral setae, distolateral corner with or without short spine; claw moderately stout, armed on both margins with close-set spinules. 3rd exopod segment slightly longer than wide, armed with 2 apical setae; medial seta 3 times as long as lateral seta. Endopod 1-merous, reaching slightly beyond midlength of 1st exopod segment; distal margin oblique, bearing a close-set row of fine setae and 2 somewhat larger setae.

Male: Length about 1.25 mm (prosome 0.89–0.94 mm). Greatest width at level of 2nd pedigerous somite. Suture between 4th and 5th pedigerous somites complete dorsally, but weaker than sutures between other somites. Posterior corners of 5th somite produced into short, narrow, only slightly divergent spine-tipped lobes; right lobe slightly longer and directed slightly more laterad. Genital segment asymmetrical, bulging laterally more on left side than on right side; right posterolateral corner armed with a seta. Posterior part of urosome curved to right in preserved specimens.

Right 1st antenna with spines on segments 10, 11, 13, and 15; segment 16 without spine. Spines on segments 10 and 11 subparallel to axis of antenna, that on segment 11 much longer. Spine on segment 13 very large, with minute incision at apex. Segment 23 with very narrow hyaline fringe.

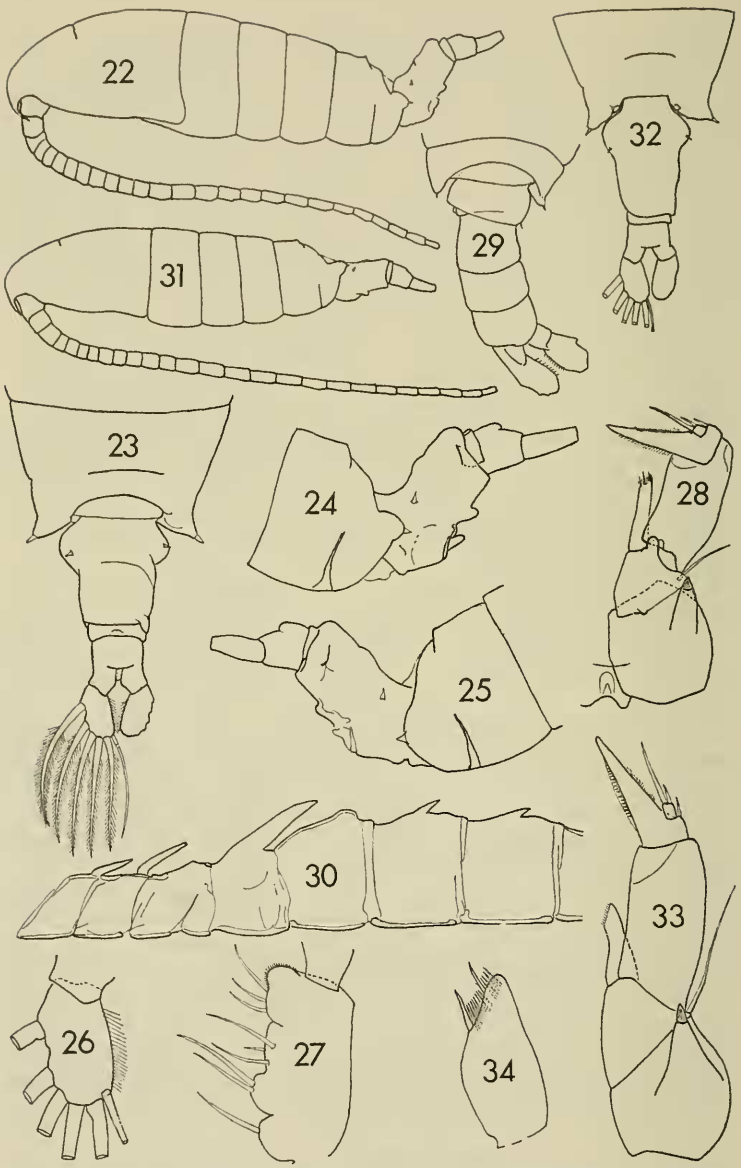
Right leg 5, 1st basal segment with strong conical process bearing sensillum on posterior surface. 2nd basal ⅓ longer than 1st; outer seta at distal ¼. Exopod (excluding claw) subequal in length to basipod; 1st segment slightly longer than wide, distolateral margin produced into rounded lobe anteriorly and triangular process posteriorly. 2nd exopod segment nearly 2½ times as long as 1st, slightly less than twice as long as wide; both margins moderately convex; lateral spine subterminal, shorter than width of segment; terminal claw slightly longer than exopod, bent at distal ⅔. Endopod short, oval; fused with 2nd basal segment; medial margin bearing row of close-set setae.

Left leg 5 slightly more slender than right, reaching beyond middle of 1st exopod segment of right leg. 1st basal segment nearly ¾ as wide as long; sensillum inconspicuous, inserted on small lobe. 2nd basal segment with margins gradually converging distally. Exopod with widely separated proximal and distal hairy pads; proximal pad incompletely divided

---

←

19, right leg, proximal segments in situ, lateral. 20, right leg, terminal claw in situ, dorsal. 21, same, ventral.



FIGS. 22–34. *Notodiaptomus venezolanus deeveyorum*. 22–28, ♀: 22, lateral, 23, urosome, dorsal. 24, urosome, right side. 25, urosome, left side. 26, right caudal ramus. 27, maxilliped, 1st basal. 28, leg 5.

into 2 lobes by medial sinus; distal process conical, straight; proximal process about as long as distal process but more slender.

Relationships: Kiefer (1956) lists 18 species of *Notodiaptomus*, of which seven have a relatively short lateral spine on the 2nd exopod segment of the right ♂ leg 5. Of the latter seven species, only *N. carteri* (Lowndes, 1934) is known to agree with *N. cearensis* in lacking a spine on segment 16 of the ♂ right antenna. *N. carteri* differs from *N. cearensis* in the 2-merous endopod on the ♀ leg 5 and in the evenly curved terminal claw of the ♂ right leg 5.

In two species having short lateral spines on the right ♂ leg 5, the armature of the ♂ grasping antenna is unknown, viz. *N. incompositus* (Brian, 1926), and *N. isabelae* (Wright, 1936). I have examined specimens of *N. incompositus* in the collections of the Division of Crustacea from Lago Chascomus, Argentina, collected and identified by Stillman Wright (USNM 92961) and found a small but distinct spine on segment 16. No specimens of *N. isabelae* are available to me, but Wright's illustration of the ♂ leg 5 shows that it differs from *N. cearensis* in the oval shape of the right 2nd exopod segment and in the slightly but evenly curved terminal claw.

Remarks: Because of the brevity of Wright's description the Barrancas specimens cannot be assigned to *N. cearensis* with absolute confidence. However, Wright's illustration of the ♂ 5th leg, a copy of which is given herein (Fig. 35), matches closely the 5th legs of Barrancas ♂♂ (Fig. 17), and there is nothing in Wright's description that excludes the Barrancas specimens. Unfortunately Wright did not deposit types or other specimens of *N. cearensis* in the Smithsonian Institution. For certain identification the Barrancas specimens should be compared with topotypes, especially in view of the distance, about 2000 km, separating Barrancas from the Brazilian localities cited by Wright (northeast Ceará, western Parahyba, and Rio Grande do Norte).

Notodiaptomus venezolanus deeveyorum, new subspecies

Figures 22–30, 36–39

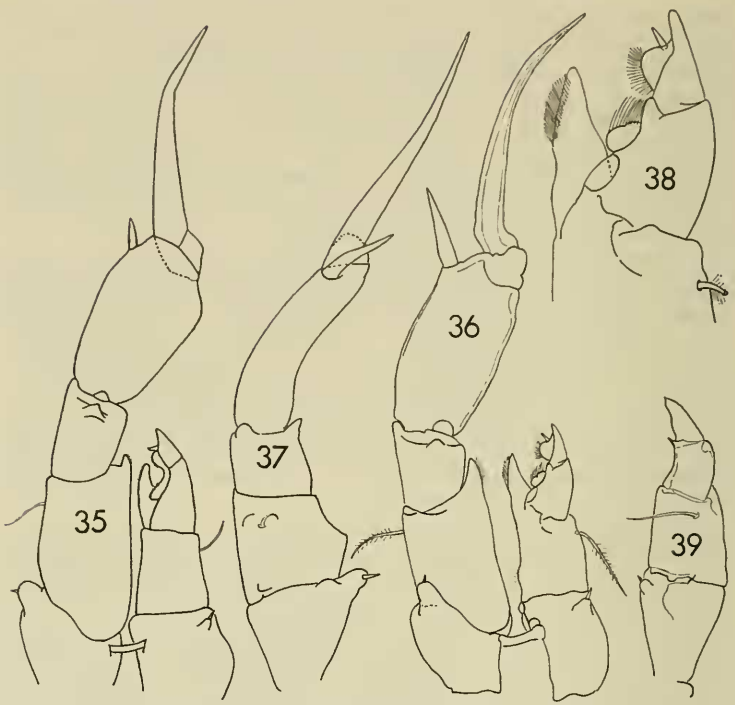
Diagnosis: Closely resembling the typical subspecies, but body longer (♀ 1.5 mm, ♂ 1.35 mm) and 1st antenna relatively shorter, reaching slightly beyond posterior margin of genital segment.

Additional description. Female. Length about 1.5 mm (prosome 1.04–1.09 mm). Suture between pedigerous segments 4 and 5 present dorsally and ventrolaterally, absent dorsolaterally. Wings of 5th pedigerous segment less oblique than in *N. cearensis*, asymmetrical (most evident in lateral view, Figs. 24–25). Genital segment slightly longer

---

←

29–30, ♂: 29, urosome, dorsal. 30, right 1st antenna, segments 10–16. *Notodiaptomus venezolanus venezolnaus*, ♀: 31, lateral. 32, urosome, dorsal. *Notodiaptomus cearensis*, ♀: 33, 5th leg. 34, 5th leg, endopod.



Figs. 35–39. *Notodiaptomus cearensis.* 35, ♂ leg 5 (copied from Wright, 1936). *Notodiaptomus venezuelanus deeveyorum.* 36–39, ♂ leg 5: 36, posterior view. 37, right leg in situ, lateral. 38, left leg, posterior. 39, left leg in situ, lateral.

than rest of urosome combined; lateral lobes bulging outward more abruptly than in *N. cearensis*; spines on lobes inserted more dorsally, inward from apex of lobe. Right posterior corner of genital segment produced into rounded lobe. 2nd urosome segment very short, on left side not reaching ventral margins of genital and anal segments.

1st antenna reaching slightly beyond posterior margin of genital segment; segment 11 with 1 seta; segments 13–21 each with 1 seta. Except for segment 11, armature of segments exactly as in *N. cearensis.*

Maxilliped as in *N. cearensis,* with 3 setae on 4th lobe of 1st basipod.

Leg 1 as in *N. cearensis,* but with single patch of hairs on posterior surface of 1st basipod, corresponding to distal patch in *N. cearensis.* Leg 2 with triangular cuticular lobe on posterior surface of 2nd endopod segment. Leg 5 like that of *N. cearensis.*

Male: Length about 1.35 mm (prosome 0.9–1.2 mm). Greatest width at level of 1st pedigerous segment. Suture between 4th and 5th

pedigerous segment complete, but weaker dorsally than sutures between other segments. Right lobe of 5th segment slightly less divergent than that of *N. cearensis*. Urosome like that of *N. cearensis* but less strongly curved to the right.

Right 1st antenna with spines on segments 10, 11, 13, 15, and 16. Third-from-last segment with very narrow hyaline fringe.

Right leg 5, exopod distinctly longer than basipod; 1st exopod segment as in *N. cearensis*; 2nd exopod segment about 2½ times as long as 1st, slightly more than twice as long as wide, subrectangular; lateral spine nearly terminal, length subequal to width of segment, about ⅓ length of terminal claw. Terminal claw as long as exopod, evenly curved. Endopod as in *N. cearensis*, but shape more triangular.

Left leg 5 reaching distal end of 1st exopod segment of right leg, closely resembling that of *N. cearensis*.

Etymology: The new subspecies is named after Edward S. Deevey, Jr., and Georgiana B. Deevey, in recognition of their many contributions to aquatic biology.

Types: Holotype ♀, USNM 142704; and 68 paratypes, USNM 142705, from shallow gully near Barrancas, Venezuela, collected 26 November 1967 by Edward S. Deevey, Jr., and Georgiana B. Deevey.

I have compared the Barrancas diaptomids with specimens of *N. venezolanus* from the type-locality, Lake Valencia, Venezuela, about 600 km (480 miles) WNW of Barrancas (Figs. 31–32). The Lake Valencia specimens (USNM 53797) were collected by A. S. Pearse and reported by him as *Diaptomus conifer* Sars (Pearse, 1921). Pearse's specimens agree closely with Kiefer's (1954, 1956) descriptions and differ from the Barrancas specimens in the smaller size (♀ about 1.12–1.18 mm; ♂ 1.02–1.06 mm) and the relatively longer 1st antennae, which reach beyond the caudal rami by the last 3 segments (Fig. 31). The armature of the ♂ and ♀ 1st antennae and the structure of the ♂ and ♀ 5th legs are identical in the two forms. The clearcut differences in first antennal length warrant subspecific recognition of the two populations, but this decision could be altered when the now largely unknown diaptomid fauna of northern Venezuela becomes adequately studied.

Literature Cited

Brian, Alessandro. 1926. Di alcuni copepodi d'acqua dolce dell' Argentina. Mem. Soc. Entomol. Italiana 4:177–200.

Deevey, Edward S., Jr., and Georgiana B. Deevey. 1971. The American species of *Eubosmina* Seligo (Crustacea, Cladocera). Limnol. Oceanogr. 16(2):201–218.

Fleminger, Abraham. 1967. Taxonomy, distribution and polymorphism in the *Labidocera jollae* group, with remarks on evolution within the group (Copepoda: Calanoida). Proc. U.S. Nat. Mus. 120(3567):1–61.

Kiefer, Friedrich. 1954. Drei neue Ruderfusskrebse aus Venezuela Zool. Anz. 153(7/8):170–174.

———. 1956. Freilebende Ruderfusskrebse (Crustacea Copepoda). I. Calanoida und Cyclopoida. Ergeb. deutschen Limnol. Venezuela-Exped. 1959. 1:233–268, 6 tables on foldout sheet.

Lowndes, Ashley G. 1934. Results of an expedition to Brazil and Paraguay in 1926–27 supported by the Trustees of the Percy Sladen Memorial Fund and the Executive Committee of the Carnegie Trust for Scotland. Copepoda. J. Linnaean Soc. London, Zoology 39(263):83–131.

Pearse, Alfred S. 1921. Crustacea from Lake Valencia, Venezuela. Proc. U.S. Nat. Mus. 59(2381):459–462.

Wright, Stillman. 1936. Preliminary report on six new species of *Diaptomus* from Brazil. Ann. Acad. Brasileira Sci. 8(2):79–85, pls. 1–2.